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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/770,634	01/29/2001	Fumio Yoshii	1858-25	6760

7590

08/14/2002

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EXAMINER

KRISHNAN, GANAPATHY

ART UNIT

PAPER NUMBER

1623

DATE MAILED: 08/14/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/770,634

Applicant(s)

YOSHII ET AL.

Examiner

Ganapathy Krishnan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11, 13 and 14 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-11, 13 and 14 is/are rejected.
- 7) ☐ Claim(s) 12 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

The preliminary amendments to claims 7, 8, 11, 12 and 13 submitted January 29, 2001 are noted.

Only the English translations of non-patent documents listed in PTO-1449 made available during examination of this application were considered. Document # 1O07; "Radiation Processing of Biodegradable Polymer 3 Improvement of Processability. Yoshii et al, Gunma University, pages 13-16 was not available at the time of examination of this application. Documents 2G05 and 1A07 were considered based on the year of publication printed on them. The year of publication was not cited for these two documents in PTO-1449.

Specification

The disclosure is objected to because of the following informalities: On page 12 of the specification, dashes appear between words (lines 15 and 17). These should be removed.

Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-14 recite "self-cross-linking alkyl cellulose derivative". It is not clear if the process as instantly claimed produces an alkyl cellulose derivative that is capable of cross-linking by itself or if the process as instantly claimed effects the cross-linking of the alkyl

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cellulose derivative. If the process as instantly claimed effects the cross-linking of the alkyl cellulose derivative, it should be changed to "self-cross-linked". For the purpose of prosecution of this case, it is assumed that the process as instantly claimed produces self-cross-linked alkyl cellulose derivative. The term 'derivative' appearing in the instant claims is confusing. Alkyl cellulose itself is a derivative of cellulose. Hence it is not clear what is meant by alkyl cellulose derivative. Also, the word "starting" in "starting alkyl cellulose" must be removed in all the claims in which it appears. It is confusing.

Claims 1,9 and 10 contain limitations within parentheses. The limitations within the parentheses render the claims indefinite because it is unclear whether the applicants intend these limitations to be part of the instant claims. The parentheses should be removed. For the purpose of prosecution of this case, the limitations within the parentheses in these claims are considered to be part of the instant claims.

Claim 1 recites "and the carboxyl group may form a salt". It is not clear what is meant by this phrase. If the carboxyl group is in the form of the salt before irradiation it should be stated "and the carboxyl group may be in the form of a salt

Claim 3 recites "wherein 20% or more of the entirety of the carboxyl groups of the starting alkyl cellulose derivative forms and alkali metal salt..". Since Claim 3 depends on Claim 1, it is not clear if the process as instantly claimed produces the instantly claimed salts or if the alkyl cellulose in the form of the salt is being irradiated.

Claim 5 recites "wherein the self-cross-linking alkyl cellulose derivative has a gel fraction of 0.1% or more". The claim recitation is confusing. It is not clear if the process as instantly claimed produces the self-cross-linking alkyl cellulose derivative in the form of a gel

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with a gel fraction of 0.1% or more or if the alkyl cellulose derivative with a gel fraction of 0.1% or more is used in the instantly claimed process.

Claim 6 recites, "as reduced to gamma rays". It is not clear what is meant by this phrase. It should be removed.

Claim 11 recites "30 times or more the weight of the derivative". It is not clear what is meant by the term "derivative" which appears at the end of the claim. It should be restated to clearly indicate if the amount of water absorbed is 30 times or more of the weight of the cross-linked alkyl cellulose or if it is 30 times or more than the weight of the alkyl cellulose before cross-linking.

Claim 14 recites "a ground-improving agent, or "a soil-improving agent". It is not clear what is meant by these terms. The terms are vague and do not indicate what the improvement is.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leavitt (Journal of Polymer Science, vol. 51, pages 349-357, 1961) in combination with Wach et al

(1A07 "Radiation Processing of Biodegradable Polymer 3; "Cross-linking of Cellulose Ethers At High Concentrated Aqueous Solution", 2000, English translation), Wach et al (2G05 "Radiation Crosslinking of Cellulose Ethers and Its Biodegradability", 2000, English translation), and Wach

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et al (1008"Radiation Processing of Biodegradable Polymer (2) Hydrogel from Cellulose Derivatives", 1999, English translation), Schweiger (USPN 4,242,506) and Assarsson (USPN 3,898,143).

Claims 1-14 are drawn to a process of producing a self-cross-linking cellulose derivative which comprises irradiating, with radioactive rays, a mixture of alkylcellulose derivative and water; the starting alkylcellulose derivative is carboxyalkyl cellulose, hydroxyalkyl cellulose; the alkyl cellulose derivatives forms an alkali metal salt, an ammonium salt or an amine salt; wherein the alkyl cellulose derivative has a polymerization degree of 10-2000 and an average etherification degree of 0.5 or more; the self-cross-linking alkyl cellulose derivative has a gel fraction of 0.1% or more; the dose rate of the radioactive rays is 0.1kGy; drying of the self-cross-linking alkyl cellulose derivative; wherein the alkyl cellulose derivative is degraded in aqueous solution to 50% and 70% or more by cellulase; wherein the self-cross-linking alkyl cellulose derivative absorbs 30 times more water than the weight of the derivative; a gel with a compressive strength of 100 g/cm² or more and products and materials containing the self-cross-linking derivative; use of the self-cross-linking derivative as ground-improving and soil-improving agent.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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Leavitt teaches the cross-linking of 1% aqueous solutions of methyl cellulose, methylhydroxypropyl cellulose and methyl hydroxybutyl cellulose by gamma irradiation at a dose rate of 0.1Mrad/hr (see page 350, Experimental and page 351, note b below Table 1). He also teaches self-cross-linking of methylcellulose, methylhydroxypropyl cellulose and methyl hydroxybutyl cellulose at various concentrations (Table I, page 351; Table II, page 352; Table V, page 353) and various dosage of radiation (Table II, page 352; Table III, page 353 and Table V, page 355).

However, Leavitt does not teach starting cellulose derivatives as salts, starting alkyl cellulose derivative having a polymerization degree of 10-2000 and an average etherification degree of 0.5 or more, a gel fraction of 0.1% or more, drying step, degradation of the self-cross-linking alkyl cellulose derivative by cellulase, self-cross-linking alkyl cellulose derivative which absorbs water 30 times or more water, a gel with a compression strength of 100g/cm^2 or more, products comprising the self-cross-linking alkyl cellulose derivative and its uses in soil and ground improving and as chromatography carrier.

Wach et al (1A07 "Radiation Processing of Biodegradable Polymer 3; "Cross-linking of Cellulose Ethers At High Concentrated Aqueous Solution", 2000, English translation) teach cross-linking of sodium carboxymethyl cellulose, hydroxypropyl cellulose and hydroxyethyl cellulose and methylcellulose of various molecular weights and degree of substitution, in aqueous solution by gamma ray irradiation and electron. They also teach the biodegradability tests of 20% aqueous solutions in acetic acid - NaOH buffer at pH 5.0 and a temperature of 37 degrees Celsius by cellulase (see page 14, Summary; page 15, lines 1-7 and Figure 2, page 15) to

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almost complete degradation in eight hours. These cross-linked cellulose derivatives also had a gel fraction of over 40%(page 15, line 8 and huge swelling ability (page 13, lines 9-10). The irradiation was done at 10kGy/h (page 14, see under Experimental).

Teachings similar to this are also disclosed in Wach et al (2G05 "Radiation Crosslinking of Cellulose Ethers and Its Biodegradability", 2000,English translation) and Wach et al (1008"Radiation Processing of Biodegradable Polymer (2) Hydrogel from Cellulose Derivatives", 1999, English translation).

Schweiger teaches drying of a cross- linked cellulose sulfate (col. 9, line 67 to col.10, line2). Even though the drying step is done in the case of cross-linked cellulose acetate obtained by using a cross-linking agent, it is obvious to include the drying part in the instantly claimed process.

However, the art cited above do not teach a gel with compression strength of 100g/cm^2 or more, products comprising the self-cross-linking alkyl cellulose derivative and its uses in soil and ground improving and as a chromatography carrier.

Assarsson et al teach the use of radiation cross-linked cellulose derivatives (col. 1 lines 56-67 and col.3, lines 11-17) in a wide variety of fields like agricultural applications, as soil moisture retainers and cosmetic articles like sanitary napkins etc. (col.4, lines 4-13).

It would have been prima facie obvious to one of an ordinary skill in the art at the time the invention was made to combine the teachings given the prior art above to make self-cross-linked cellulose derivatives using the process of irradiation and using the instantly claimed

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derivatives in the instantly claimed applications since the process steps and the products, with the instantly claimed properties and applications are seen to be set forth in the teachings cited above.

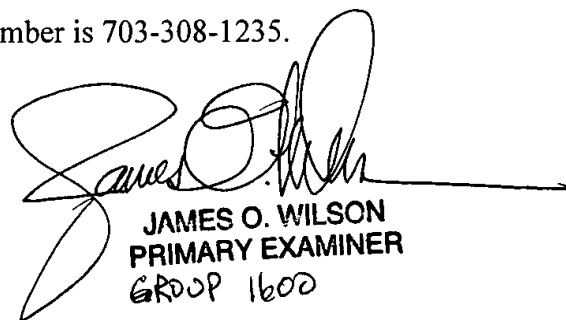
One of ordinary skill in the art would be motivated to practice the instantly claimed procedural steps because the process uses readily available starting materials and also does not seem to involve many tedious steps. It also uses water as a solvent, which other than being readily available is also environment friendly, unlike organic solvents, which if retained in the cross-linked alkyl cellulose might be a problem in the instantly claimed agricultural, soil and other applications.

Claim 12 is objected to because it depends on a rejected claim.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ganapathy Krishnan whose telephone number is 703-305-4837. The examiner can normally be reached on 8.30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Johann Richter can be reached on 703-308-4532. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3014 for regular communications and 703-305-3014 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1235.



JAMES O. WILSON
PRIMARY EXAMINER
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